

PATENT SPECIFICATION

847,947



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Date of filing Complete Specification: September 30, 1958

Application Date: August 6, 1957.

No. 24736/57

Complete Specification Published: September 14, 1960

Index at Acceptance:— Class 125(3), T(4F:9A).

International Classification:— B67b.

COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements relating to the Dispensing Plugs of Containers

WE, THE BRITISH XYLONITE COMPANY LIMITED, a British Company, of Highams Park, London E.4., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to containers, and for example those of the so-called squeeze-to-use variety, equipped with a dispensing plug in the discharge opening thereof.

A primary aim is to facilitate the quick and foolproof insertion of the dispensing plug into proper position in the container opening, and to thereafter retain it in the closure position against inadvertent dislodgement.

To this end, the invention resides broadly in the provision, in a container of the above kind, of means for locating and fastening said plug in position, comprising at least one deformable rib on the plug seating in a corresponding groove in the surrounding wall of the discharge opening, or vice versa, to produce a snap-in, tight fit.

The invention is, however, particularly applicable to the so-called squeeze-to-use variety, incorporating these features.

Such containers, which are usually made wholly or partly of a flexible plastic material, for example polyethylene, are used for a wide variety of purposes, and the plugs with which they are equipped also take numerous forms. Thus, for example, in some instances they are intended for atomising purposes, and in cases of this sort are sometimes provided with an atomising chamber, from which depends a capillary tube such that, when pressure is applied to the walls of the container by the hand of a user liquid or other commodity in the container is forced upwards through the tube, and at the same time air is forced into the mixing chamber and thence through an orifice in the plug carrying the liquid, powder or the like with it in a spray. In other instances the plug may form a direct discharge

nozzle for the contents of the container.

A frequent problem which arises in these squeeze-to-use containers is that the pressure exerted on the wall or other flexible part of the container for the purposes indicated may apply air pressure to the inner surface or surfaces of the plug, especially when this is of a substantial area, which may force it out of its seat in the container—a happening which may obviously have unpleasant and wasteful consequences, and it is an object of this invention to provide a safeguard against such accidents.

Thus, the present invention also includes a squeeze-to-use container with a dispensing plug in the discharge opening thereof, at least one cooperating resilient rib around the dispensing plug cooperating with a conforming and accommodating groove in the seat for the plug in the container whereby the plug can be snapped into, and positively located in, the required position in its seat and will resist separation therefrom under an applied air pressure.

The fastening in question may take several forms, depending on the structure of the plug, the form of the seat in which it is mounted and the materials of which the plug and seat are respectively made.

Thus, for example, if the plug is moulded from a resilient thermoplastic, it may conveniently be provided in moulding with a single annular rib, and the seat therefor in the container, for example in the neck or around the discharge opening of the latter, may be furnished with a single corresponding groove, to receive the rib. In this arrangement, the groove may be formed in a non-resilient part of the container, the rib itself being resilient enough to allow for the necessary pre-compression of the plug prior to snapping of the rib into the groove. As will be understood, the reverse arrangement is possible, i.e. to have the rib rigid and the groove in a resilient part of the container body. Fur-

ther, both these parts may be resilient—an arrangement which conforms to the most usual practice of having a resilient plug and a resilient container.

- 5 As will further be understood, the reverse arrangement may be used, i.e. the rib may be provided on the seat and the groove in an outer wall of the plug. Moreover there may be more than one rib with a corresponding
10 number of grooves.

The invention is illustrated in the accompanying drawings, in which:—

- Figure 1 is a perspective illustration showing a dispensing plug mounted, in accordance
15 with the present invention, in a squeeze-to-use container.

Figure 2 is a vertical cross section through the plug and neck of the container, illustrated in Figure 1 and

- 20 Figure 3 is a view on the line III-III of Figure 2.

- The container 1 illustrated in the drawings is assumed to be of polyethylene and to be gripped by the side walls in the hand and squeezed so as to apply expelling pressure
25 to the contents. It has an upstanding neck 2 defining a discharge opening, and a plug 3 made of resilient plastic, e.g. injection moulded from polyethylene, is seated on and
30 in this neck.

- This plug comprises a main body 4 having the appearance of a disc which is dimensioned to fit neatly over the neck 2 and has a cylindrical depending skirt 5 which fits within the
35 container neck. This skirt is provided with an annular rib 6 of barbed cross section which is arranged, when the plug is pushed home into the container neck, to engage in a corresponding internal groove 7 in the latter.

- 40 The rib 6, groove 7 and the parent parts of the plug and the container neck are so dimensioned relatively to one another and are so inherently deformable that, when the plug is pushed down into the neck opening, the skirt
45 5, which is inherently resilient, first yields inwardly a little until the rib 6 snaps into the groove 7. This provides a tight fit which, when pressure is applied by squeezing the container, not only resists expulsion of the
50 plug from the container neck, but is actually promoted by the internal pressure thereby exerted on the inner wall of the skirt 5.

- Further the rib 6 and groove 7 are so positioned on their respective parent parts
55 that, when the snap-in fastening is made to locate the plug in position, the underface 8 of the body 4 is applied flat against the upper rim of the neck 2 of the container and is held firmly applied against this rim, whereby an
60 effective seal is made between the plug and container additional to that afforded between the rib and groove.

- In a modification the skirt 5 may be provided at its lower rim with a flange 21 which
65 is arranged to grip below the bottle or con-

tainer neck as shown and furnish a further fastening. As with the rib 6, the flange 21 yields when the plug is pushed into the neck opening, and eventually snaps into position.

The plug has a circular boss 9 upstanding from the body disc 4 and this, in turn, has a cylindrical projection 10 upstanding centrally therefrom. This projection 10, which is provided with a discharge orifice 11 in its upper face, is intended to receive a capillary tube (not shown) which extends downwards into the liquid contents of the container and, when the container is squeezed, is arranged to conduct this liquid to the orifice 11 adjacent which it is met by a stream of air from the container, also reaching this orifice under the pressure applied by the squeezing action. This method of producing an atomized spray in such containers is well known. For the purpose of gripping the capillary tube, the projection 10 is provided with a set of annularly-spaced longitudinal ribs 12 which are enlarged at their upper ends to provide lugs 20 limiting the penetration of the tube.

Finally, the plug 3 is provided with a cap 13 which is adapted to fit over the projection 10 to close the plug when the container is not in use. This cap 13, which is integrally moulded with the remainder of the plug, is connected to the body through a flexible strap 14 and has a cylindrical cavity in the wall 18 of which is a groove 15 engaging, in the snapped-down condition, in a rib 16 on the dispensing projection 10, with the bottom 19 of the cavity bearing against the upper face of projection 10. In addition, a central tapered pip 17 outstanding from the bottom 19 is arranged to seal the orifice 11 when the cap is snapped down into its plug-closing position, as illustrated in dot and dash lines at 3' in Figure 2. This form of snap fitting cap is described and claimed in our Patent Specification No. 833270.

Although the rib 6 on the plug skirt has been indicated above as of circular cross section, it will be appreciated that this is but one elementary form which it may take and that other shapes can be employed. For example the rib may be of a tapered, polygonal barbed form in cross section. In other modifications the groove may be shaped, e.g. enlarged at its inner part, so that the end of the rib engaging therein is deformed when fully home in the groove, thereby to provide a very firm fastening effect.

WHAT WE CLAIM IS:—

1. In a container with a dispensing plug inserted in a discharge opening thereof, means for locating and fastening said plug in position, comprising at least one deformable rib on the plug seating in a corresponding groove in the surrounding wall of the discharge opening, or vice versa, to produce a snap-in, tight fit.

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2. In a squeeze-to-use container with a dispensing plug in the discharge opening therefore, at least one resilient rib around the dispensing plug cooperating with a conforming and accommodating groove in the seat for the plug in the container, whereby the plug can be snapped into, and positively located in, the required position in its seat and will resist separation therefrom under an applied air pressure.

3. In or for a container a dispensing plug having a dispensing passage therethrough and a resilient skirt with an annular rib for

engagement in a corresponding seat in the container.

4. A dispensing plug according to Claim 3, in which the skirt has a flange around its lower edge for engagement beneath the lower rim of the seat in the container.

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PROVISIONAL SPECIFICATION

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WE, THE BRITISH XYLONITE COMPANY LIMITED, a British Company, of Highams Park, London E.4., do hereby declare this invention to be described in the following statement:—

The present invention relates to containers, and in particular those of the so-called squeeze-to-use variety equipped with a dispensing plug in the discharge opening thereof.

Such containers, which are usually made wholly or partly of a flexible plastic material, for example polyethylene are used for a wide variety of purposes, and the plugs with which they are equipped also take numerous forms. Thus, for example, in some instances they are intended for atomising purposes and in cases of this sort are sometimes provided with an atomising chamber from which depends a capillary tube such that when pressure is applied to the walls of the container by the hand of a user liquid or other commodity in the container is forced upwards through the tube and at the same time air is forced into the mixing chamber and thence through an orifice in the plug carrying the liquid powder or the like with it in a spray. In other instances the plug may form a direct discharge nozzle for the contents of the container.

A frequent problem which arises in containers of the kind set forth above is that the pressure exerted on the wall or other flexible part of the container for the purposes indicated may apply air pressure to the inner surface or surfaces of the plug, especially when this is of a substantial area, which may force it out of its seat in the container—a happening which may obviously have unpleasant and wasteful consequences, and it is an object of this invention to provide a safeguard against such accidents.

To this end, a cooperating resilient rib and groove fastening is provided between the plug and the seat therefor in the container, such-wise that the plug can be snapped and positively located in the required position in its seat, and will resist separation therefrom under an applied air pressure.

The fastening in question may take several

forms, depending on the structure of the plug, the form of the seat in which it is mounted and the materials of which the plug and seat are respectively made.

Thus, for example, if the plug is moulded from a resilient thermoplastic, it may conveniently be provided in moulding with a single annular rib, and the seat therefor in the container, for example in the neck or around the discharge opening of the latter, may be furnished with a single corresponding groove, to receive the rib. In this arrangement, the groove may be formed in a non-resilient part of the container, the rib itself being resilient enough to allow for the necessary pre-compression of the plug prior to snapping of the rib into the groove. As will be understood, the reverse arrangement is possible, i.e. to have the rib rigid and the groove in a resilient part of the container body. Further, both these parts may be resilient—an arrangement which conforms to the most usual practice of having a resilient plug and a resilient container.

As will further be understood, the reverse arrangement may be used, i.e. the rib may be provided on the seat and the groove in an outer wall of the plug.

The rib may be of various cross sectional shapes, for example a simple part circular, an outwardly tapered, or a polygonal section. In an advantageous arrangement, it may be shaped so as to provide the rib with a sort of barbed form, such that the plug can readily be inserted in its seat, but will then more firmly resist a pull or thrust in the outward direction.

In accordance with a further feature of the invention, the groove may be shaped, i.e. enlarged at its inner part, so that the end of the rib engaging therein is deformed when fully home in the groove, thereby to provide a firmer fastening effect.

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